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Original Article

Clinicopathological correlates of primary cutaneous melanoma: A cross-sectional analysis of 318 lesions from a tertiary center in western Türkiye

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ABSTRACT

Background: Melanoma of the skin is responsible for the majority of deaths related to skin cancer globally, and its occurrence has been increasing over the past decades. There are four major clinical subtypes of cutaneous melanoma: superficial spreading melanoma (SSM), nodular melanoma (NM), acral lentiginous melanoma (ALM), and lentigo maligna melanoma (LMM). The clinical and pathological features differ between melanoma subtypes. **Objective:** The objective of this study was to compare demographic and pathological features to provide additional data on melanoma. **Methods:** Patients who underwent excision at Izmir Atatürk Training and Research Hospital, Türkiye, and were diagnosed with cutaneous malignant melanoma were searched in the pathology archive. Files covering the 20-year period from 2006 to 2025 were reviewed. The patients' sex, age, melanoma clinical type, localization, and Breslow thickness were compared. **Results:** A total of 313 patients with 318 malignant melanomas were identified. Trunk distribution for men and leg and finger subungual locations for women were statistically significant ($P<0.001$). ALM type was the third most common type (18.2%), after SSM (36.8%) and NM (28.9%). The plantar region shares the second-most-common location (18.9%) with the trunk (18.9%), after the head and neck (30.2%). **Conclusion:** Melanoma occurred more frequently on the trunk in men and on the legs in women. Attention should also be given to the plantar region in addition to a thorough evaluation of all body regions. The higher incidence of finger subungual melanoma in women necessitates further research

Key words: Malignant melanoma clinical subtypes, Sex, Age, Location, Breslow thickness

INTRODUCTION

Melanoma causes most skin cancer deaths worldwide, and its rates have increased in recent decades [1]. The four main clinical types are superficial spreading (SSM), nodular (NM), acral lentiginous melanoma (ALM), and lentigo maligna melanoma (LMM). Recently, experts have suggested dividing ALM into subungual and palmoplantar subtypes due to differences in clinical behavior and genetics [2]. Separate fingernail and toenail subungual ALM demographic features were evaluated in a limited number of studies [3-6]. We evaluated age, sex, location, Breslow thickness, and clinical subtypes, including fingernail and toenail subungual melanoma, in our hospital records. This study aimed to compare demographic and pathological features to provide additional data on melanoma.

MATERIALS AND METHODS

Patients who underwent excision at Izmir Atatürk Training and Research Hospital and were diagnosed with

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malignant melanoma were identified in the pathology archive. Files covering the 20-year period from 2006 to 2025 were reviewed. Patients who underwent excision at other hospitals and pathology slides referred to the pathology clinic were excluded from the study. Cases of in situ melanoma were also excluded. The patients' sex, age, melanoma clinical type, localization, and Breslow thickness were reviewed. The data were compared.

Statistical Analysis

Data were analyzed using the IBM SPSS Statistics Standard Concurrent User V 26 (IBM Corp., Armonk, New York, USA) statistical package program. Descriptive statistics were given as number of units (n), percentage (%), mean ± standard deviation, median (min-max), and interquartile range. The normality of numerical variables was evaluated using the Shapiro-Wilk test, and the homogeneity of variances was evaluated using the Levene test. The Mann-Whitney U test was used to compare two groups when the data did not follow a normal distribution. The Kruskal-Wallis H test was used when comparing three or more groups, as the data did not follow a normal distribution. Pearson Chi-square and Fisher-Freeman-Halton exact tests were used to compare categorical variables. Spearman's rho was used to examine relationships among continuous variables, as the data did not follow a normal distribution. A p-value < 0.05 was considered statistically significant.

Ethics Statement

Institutional ethics committee approval was obtained for this study (Izmir Katip Çelebi University Ethical Committee, date: 17.07.2025, number: 0476).

RESULTS

A total of 313 patients were included in the study. Of these patients, 146 (46.65%) were female and 167 (53.35%) were male. Five patients developed two malignant melanoma lesions. A total of 318 lesions were identified. The mean age of the patients was 63.25 ± 14.32 years. The most frequent location was the head and neck, detected in 96 (30.2%) patients. This was followed by the trunk and plantar regions, with 60 patients (18.9%) in each region. Upper and lower extremity locations were similarly frequent, with 41 (12.9%) patients, while toenail location was less frequent, with 10 (3.1%) patients, fingernail location with 8 (2.5%) patients, and palmar location with 2 (0.6%) patients. When clinical melanoma subtypes were evaluated, the most common subtype was superficial spreading melanoma, which was detected in 117 (36.8%) patients. This was followed by nodular melanoma 92 (28.9%) and acral lentiginous melanoma 58 (18.2%). Lentigo maligna melanoma was observed in 22 (6.9%) patients, and other melanoma subtypes were detected in 14 (4.4%) patients. Other subtypes included four desmoplastic melanomas, two spindle cell/desmoplastic melanomas, one spindle cell melanoma, four nevoid melanomas, two spitzoid melanomas, and one balloon cell melanoma. Additionally, melanoma subtype was not specified in 15 (4.7%) patients. The mean Breslow thickness was 6.37±7.35 mm (Table 1).

There was no statistically significant difference in age between female and male patients. However, there was a statistically significant difference in melanoma localization between female and male patients ($p<0.001$). Trunk melanomas were more common in men, with 14 (9.5%) women and 46 (27.1%) men. Lower extremity melanomas were more common in women, with 25 (16.9%) women and 16 (9.4%) men. Fingernail melanomas were more common in women than men, with 7 (4.7%) women and 1 (0.6%) man. The distribution of fingernail melanoma in women was as follows: three right-hand thumbs, two left-hand thumbs, one left-hand second finger, and one left-hand fifth finger. For men, there was one right-hand ring finger. There was no statistically significant difference between female and male patients in melanoma clinical subtypes or Breslow thickness (Table 2).

Table 1: Patient and melanoma descriptive characteristics (*n*=313)

	Statistics
Gender	
Men	167 (53.35)
Women	146 (46.65)
Age	63,25±14,32
	64,5 (30-95)
Localisation	
Head and neck	96 (30,2)
Upper extremity	41 (12,9)
Trunk	60 (18,9)
Lower extremity	41 (12,9)
Palmar	2 (0,6)
Hand ungual	8 (2,5)
Plantar	60 (18,9)
Foot ungual	10 (3,1)
Melanoma Clinical Subtypes	
SuperficialSpreadingMelanoma	117 (36,8)
Nodular Melanoma	92 (28,9)
Acral Lentiginous Melanoma	58 (18,2)
Lentigo Maligna Melanoma	22 (6,9)
Other	14 (4,4)
Not specified	15 (4,7)
Breslow thickness	6,37±7,35 4
	(0,10-45)

Descriptive values are presented as *n* and percentage, mean±standard deviation, and median (min-max)

There was a statistically significant difference in age among melanoma clinical subtypes (p<0.001). The ages of patients diagnosed with NM (66.86±12.83 years) and LMM (70.27±14.33 years) were higher than those with SSM (59.09±14.46 years), other melanoma types (58.42±12.38 years), and melanomas of unspecified subtype (63.13±14.72 years). The age of patients in the ALM group (65.91±14.11 years) was similar to that of the other groups (Table 3).

Table 2: Comparison of age, localization, melanoma clinical subtype, and Breslow thickness according to gender

	Sex		Test Statistics	
	Female	Male	Test value	*p* value
Age	65,03±15,26 65 (19,75)	62,20±13,35 64 (18,25)	1,747	0,081†
Localisation			23,038	<0,001‡
Head and neck	46 (31,1)[a]	50 (29,4)[a]		
Upper extremity	20 (13,5)[a]	21 (12,4)[a]		
Trunk	14 (9,5)[a]	46 (27,1)[b]		
Lower extremity	25 (16,9)[a]	16 (9,4)[b]		
Palmar	1 (0,7)[a]	1 (0,6)[a]		
Hand ungual	7 (4,7)[a]	1 (0,6)[b]		
Plantar	30 (20,3)[a]	30 (17,6)[a]		
Foot ungual	5 (3,4)[a]	5 (2,9)[a]		
Melanoma Clinical Subtypes			9,380	0,095&
Superficial Spreading Melanoma	50 (33,8)	67 (39,4)		
Nodular Melanoma	40 (27,0)	52 (30,6)		
Acral Lentiginous Melanoma	33 (22,3)	25 (14,7)		
Lentigo Maligna Melanoma	15 (10,1)	7 (4,1)		
Other	5 (3,4)	9 (5,3)		
Not specified	5 (3,4)	10 (5,9)		
Breslow thickness	5,71±6,03 4 (37,90)	6,92±8,27 4 (7,30)	0,508	0,611†

Values are presented as n and percentage or mean±standard deviation and median (interquartile range). †: Mann-Whitney U test, &: Chi-square test, ‡: Fisher-Freeman-Halton exact test. Similar letters indicate similarities between groups. Values within the same row sharing different superscript letters (a, b) are significantly different.

A statistically significant difference was found between clinical subtypes in terms of melanoma localization (p<0.001). SSM was most frequently located on the trunk, detected in 37 (31.6%) patients. NM was most observed in the head and neck region in 32 (34.8%) patients. The vast majority of ALM cases were located in the plantar region, detected in 41 (70.7%) patients; fingernail 7 (12.1%) and toenail 9 (15.5%) locations were also frequently observed in this subtype. All LMM cases were located in the head and neck region 22 (100.0%). In other melanoma types, the most frequent localization was the lower extremity, which was detected in six (42.9%) patients. In melanomas with unspecified subtypes, the most frequent locations were the head and neck region 6 (40.0%) and the trunk region 5 (33.3%) (Table 3).

There was a statistically significant difference in Breslow thickness among clinical melanoma subtypes (p<0.001). Breslow thickness in the NM group (9.30±8.12 mm) was higher than that in the SSM (4.30±4.82 mm), LMM (2.66±2.82 mm), and melanoma of unspecified subtype (5.23±4.48 mm) groups. Similarly, Breslow thickness (9.05±10.63 mm) was higher in other melanoma types than in SSM, LMM, and melanoma of unspecified subtype groups. The Breslow thickness in the ALM group (6.87±9.09 mm) was similar to that in the other groups (Table 3).

There was no statistically significant difference in age between melanoma locations (p=0.065). (Table 4) However, a statistically significant difference in Breslow thickness was found between melanoma locations (p=0.008). Breslow thickness was higher in melanomas

Table 3: Comparison of age, localization, and Breslow thickness according to melanoma clinical subtypes

	Clinical Subtypes Melanoma						Test Statistics	
	Superficial Spreading Melanoma	Nodular Melanoma	Acral Lentiginous Melanoma	Lentigo Maligna Melanoma	Other	Not specified	Test value	p value
Age	59,09±14,46 61 (20)[a]	66,86±12,83 66 (16,75)[b]	65,91±14,11 67,5 (18)[ab]	70,27±14,33 72 (12,25)[b]	58,42±12,38 58,5 (20,75)[a]	63,13±14,72 62 (30)[a]	24,564	<0,001*
Localisation							247,48	<0,001‡
Head and neck	31 (26,5)[a]	32 (34,8)[a]	0 (0,0)[b]	22 (100,0)[c]	5 (35,7)[a]	6 (40,0)[a]		
Upper extremity	25 (21,4)[a]	12 (13,0) [ab]	0 (0,0)[b]	0 (0,0)[ab]	2 (14,3)[ab]	2 (13,3)[ab]		
Trunk	37 (31,6)[a]	17 (18,5)[ab]	0 (0,0)[c]	0 (0,0)[bc]	1 (7,1)[abc]	5 (33,3)[ab]		
Lower extremity	16 (13,7)[a]	18 (19,6)[ab]	0 (0,0)[c]	0 (0,0)[bc]	6 (42,9[a]	1 (6,7)[abc]		
Palmar	1 (0,9)[a]	0 (0,0)[a]	1 (1,7)[a]	0 (0,0)[a]	0 (0,0)[a]	0 (0,0)[a]		
Hand ungual	0 (0,0)[a]	1 (1,1)[ab]	7 (12,1)[b]	0 (0,0)[ab]	0 (0,0)[ab]	0 (0,0)[ab]		
Plantar	7 (6,0)[a]	11 (12,0)[a]	41 (70,7)[b]	0 (0,0)[a]	0 (0,0)[a]	1 (6,7)[a]		
Foot ungual	0 (0,0)[a]	1 (1,1)[a]	9 (15,5)[b]	0 (0,0)[ab]	0 (0,0)[ab]	0 (0,0)[ab]		
Breslow thickness	4,30±4,82 2,90 (4,48)[a]	9,30±8,12 7 (8)[b]	6,87±9,09 3,75 (5,18)[ab]	2,66±2,82 1,75 (3,38)[a]	9,05±10,63 5 (12,03)[b]	5,23±4,48 4,32 (9,18)[a]	53,430	<0,001*

Values are presnted as n and percentage or mean±standard deviation and median (interquartile range). *: Kruskal Wallis H test, &: Chi-square test, ‡: Fisher-Freeman-Halton exact test. Similar letters indicate similarities between groups. Values within the same row sharing different superscript letters (a, b, c) are significantly different.

Table 4: Comparison of age and Breslow thickness according to localisation

	Age	Breslow thickness
Localisation		
Head and neck	66,20±14,93	5,36±6,18
	67,5 (18,5)	3,90 (5,20)[a]
Upper extremity	62,09±13,36	4,57±5,97
	60 (16)	2,30 (5,75)[a]
Trunk	59,10±12,83	5,61±6,20
	62 (18)	3 (6,30)[a]
Lower extremity	61,24±14,23	8,10±7,77
	60 (18,5)	6 (8,60)[b]
Palmar	56,0±1,41	2,64±1,92
	56 (-)	2,64 (-)[c]
Hand ungual	63,25±16,29	5,43±4,72
	62 (26,25)	5,60 (8,70)[a]
Plantar	66,38±14,43	9,30±10,27
	68 (18)	5 (10)[b]
Foot ungual	64,0±14,66	4,64±2,52
	63 (21,5)	5 (4,80)[a]
H value	12,976	18,931
p value	0,065	0,008

Values are presented as n and percentage or mean±standard deviation and median (interquartile range). *H*: Kruskal Wallis test. Similar letters indicate similarities between groups. Values within the same column sharing different superscript letters (a, b, c) are significantly different

located in the lower extremity (8.10±7.77 mm) and plantar (9.30±10.27 mm) regions than in those located in the head and neck (5.36±6.18 mm), upper extremity (4.57±5.97 mm), trunk (5.61±6.20 mm), fingernail (5.43±4.72 mm), and toenail (4.64±2.52 mm). Breslow thickness (2.64±1.92 mm) was lower in palmar melanomas than in melanomas located in the head and neck, upper extremity, trunk, fingernail, and toenail. No statistically significant difference was observed in Breslow thickness between melanomas located in the head and neck, upper extremity, trunk, fingernail, and toenail. Significant differences in Breslow thickness were also observed between lower extremity, plantar, and palmar melanomas (Table 4).

There was a statistically significant, weak, positive correlation between age and Breslow thickness (rho=0.198; p<0.001) (Table 5). Breslow thickness increases with age.

Table 5: Comparison of Breslow thickness and age

	Breslow thickness
Age	
rho	0,198**
p	<0,001

rho: Spearman correlation coefficient

DISCUSSION

Our study found a higher incidence of melanoma in men, which may be due to greater exposure to UV radiation or greater sensitivity to it [7]. Our cohort was at a notably high risk, as evidenced by a median thickness of 4.00 mm across 318 lesions, suggesting that the study group was predominantly composed of patients with advanced primary disease. This contrasts with general epidemiological trends, where the median Breslow thickness is often below 1 mm [8]. Our hospital is a tertiary center to which advanced melanoma cases could be referred, which might explain the high Breslow thickness.

Sex and Age

There were no statistically significant differences between age and sex. In comprehensive epidemiological studies in countries with predominantly fair-skinned populations, a bimodal or altered age distribution was often observed between the sexes: women tended to present more frequently at younger ages (under 50, typically due to limb/recreational UV exposure), whereas men were more prevalent in older age groups (over 65, primarily due to prolonged scalp/trunk exposure) [9,10]. In Türkiye, the predominance of skin types 3 and 4 among the population may account for the lack of statistical significance.

Sex and Localization

Males exhibited a distinct predilection for trunk melanomas, whereas females were significantly more likely to present with lesions on the lower extremities and finger subungual/nail bed locations (p<0.001). Trunk and lower leg predisposition to men and women, respectively, align with the literature that emphasizes intermittent sun exposure patterns [9].

A remarkable finding in our study was the strong tendency for hand ungual (fingernail) melanomas to occur more frequently in females. Interestingly, this sex-specific imbalance was confined to the upper limbs, as foot ungual (toenail) cases showed complete clinical symmetry between sexes. In limited studies, men have been found to have a higher incidence of subungual melanoma [3], whereas in another study, men and women were reported to be equally affected [4]. In a recent review of eight studies, male predominance was observed [5]. In one study from Türkiye, female and male subungual melanomas did not differ significantly [6].

In our study, fingernail dominance in women may be due to higher levels of health-seeking behavior and

more thorough skin self-examination among female patients, which aids in the early clinical identification and biopsy of conspicuous fingernail lesions [11]. This female dominance in fingernail areas might also be attributed to unique cosmetic or manual microtrauma patterns. The relationship between exposure to chemical substances and melanoma has been reported in a review of observational studies, and a case-control study on this topic was recommended [12]. Specifically, a relationship between exposure to organic chemicals and melanoma has been reported [13]. Women may have higher exposure than men due to housework, traditional nail polish use, and, in recent years, gel nail polish use. Especially with gel nails, the use of UV lamps and soaking in acetone, an organic chemical solvent, for 10-20 minutes for removal is necessary [14]. A review stated that gel manicures have shown mutagenicity in keratinocytes in vitro, but no melanoma cases have been reported [15]. Another review reported no cases of increased risk of melanoma or non-melanoma cancers associated with gel polish use in patients under 40 years of age [16], but our female patients with nail melanoma were 40 years and older. Because we conducted a retrospective study of our patients' files, we were unable to investigate their chemical exposures or nail care treatments; however, given the statistical significance of the findings, we recommend further research on this topic [12].

Sex and Melanoma Clinical Subtypes

There was no statistically significant difference between sex and melanoma clinical subtypes. A registry-based study conducted on fair-skinned individuals found that women were diagnosed with SSM and NM at a younger age than men [17]. In Türkiye, the majority of the population exhibits skin types 3 and 4, which could explain the lack of statistical significance.

Sex and Breslow Thickness

No statistically significant difference in Breslow thickness was observed between female and male cohorts. In the literature, women have been found to have lower Breslow thickness, which is associated with greater health-seeking behavior [10]. Our hospital is a tertiary referral center with a high mean Breslow thickness; gender discrepancy could not be evident.

Melanoma Clinical Subtype and Age

Patients with NM and LMM were older than those with SSM ($p<0.001$). LMM was observed in the oldest demographic profile, whereas SSM was observed in significantly younger individuals, consistent with the literature [18-20]. ALM showed a similar age distribution to other melanoma types.

Melanoma Clinical Type and Localization

SSM, NM, and ALM were most commonly found on the trunk, head/neck, and plantar regions, respectively, and LMM was found on the head/neck ($p<0.001$), consistent with the literature [21-24]. Among the 18 fingernail and subungual melanomas, 16 were ALM, and 2 were NM. ALM mostly occur in the plantar regions; during dermatological examination, the plantar regions should also be examined, as patients may be unaware of plantar lesions.

Melanoma Clinical Subtype and Breslow Thickness

NM was thicker than SSM or LMM ($p<0.001$), consistent with the literature [25]. Nodular melanomas do not exhibit an extended horizontal growth phase and instead grow vertically at a much faster rate, resulting in considerably thicker dimensions than SSM or LMM.

Localization and Age

No statistically significant difference was observed between localization and age. Age is closely linked to lesion location in the literature, particularly in fair-skinned populations [17,26]. Individuals with lesions on areas of the face that are frequently exposed to the sun (head/neck) or on specific distal regions (plantar/foot subungual) are generally older than those with primary lesions on the torso (trunk) or legs. The predominance of skin types 3 and 4 in the population of Türkiye may explain the lack of statistical significance.

Localization and Breslow Thickness

Breslow thickness was greater in the lower extremities and plantar region ($p=0.008$). The upper extremities had the smallest median measurements, indicating that concealed locations in the plantar region and lower extremities contribute to delays in diagnosis.

Age and Breslow Thickness

Older patients had higher Breslow thickness ($p<0.001$). This could indicate age-related reductions in localized immune surveillance or a delay in diagnostic recognition among older populations [20].

This study contributes novel data on the demographic features of subungual melanoma and the importance of whole-body dermatological examination, including the plantar regions. The results of this study may have limited generalizability because it was conducted at a single tertiary hospital, where advanced melanoma cases could be referred. In addition, the evaluation of the Turkish population may not reflect the demographic features of other countries. The retrospective file evaluation was another limitation of this study.

CONCLUSION

Since melanoma is commonly found on the trunk in men and on the legs in women, attention should be paid to this aspect during a dermatological examination, along with an examination of every area. Particular attention should also be paid to the plantar region, as in our series, which had the same frequency of trunk melanomas. The higher incidence of subungual melanoma in women necessitates case-control or prospective studies to determine whether it is due to more examination-seeking behavior relative to men or as a result of nail cosmetics or other chemicals.

Statement of Human and Animal Rights

All the procedures followed were in accordance with the ethical standards of the committee responsible on human experimentation (institutional and national) and with the 2008 revision of the Declaration of Helsinki of 1975.

Statement of Informed Consent

Informed consent for participation in this study was obtained from all patients.

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